



PubMed Nucleotide Protein Genome Structure PopSet Taxonomy OMIM Br

Search PubMed for [] Go Clear
Limits Preview/Index History Clipboard Details

About Entrez

Display Abstract Sort Save Text Clip Add Order

Text Version

☐ 1: J Reprod Fertil Suppl 1993;48:31-43

Related Articles, Books, LinkOut

Entrez PubMed

[Overview](#)
[Help | FAQ](#)
[Tutorial](#)
[New/Noteworthy](#)

PubMed Services

[Journal Browser](#)
[MeSH Browser](#)
[Single Citation Matcher](#)
[Batch Citation Matcher](#)
[Clinical Queries](#)
[LinkOut](#)
[Cubby](#)

Related Resources

[Order Documents](#)
[NLM Gateway](#)
[TOXNET](#)
[Consumer Health](#)
[Clinical Alerts](#)
[ClinicalTrials.gov](#)
[PubMed Central](#)[Privacy Policy](#)

Cytoplasmic inheritance and its effects on development and performance.

Smith LC, Alcivar AA.

Centre de Recherche en Reproduction Animale, Faculte de Medecine Veterinaire, Universite de Montreal, Saint-Hyacinthe, QC, Canada.

In contrast to nuclear inheritance, cytoplasmic inheritance in mammals is derived mostly, if not exclusively, from the maternal line. Mitochondria, and their DNA molecules (mtDNA), are the genetic units of this method of inheritance. Mammalian mtDNA codes for 13 enzymes used in the mitochondrial energy-generating pathway, oxidative phosphorylation, 22 tRNAs and two rRNAs. Although all transcripts of mtDNA and their translational products remain in the mitochondria, most proteins used in mitochondria are from nuclear DNA and are imported after synthesis on cytoplasmic ribosomes. Spermatozoa introduce a small number of mitochondria into the cytoplasm of the egg at fertilization, which appear to be digested soon after penetration. Although the paternal contribution of mtDNA to the offspring is not believed to occur in mammals, some interspecific crosses have suggested that it does occur. Experiments with animals derived from reconstituted embryos, using nuclear or cytoplasmic transplantations, suggest that nuclear-mitochondrial interactions are important but not essential in the survival and replication of exogenous mitochondria introduced into the egg. As the levels of heteroplasmy varied in several tissues of animals derived from reconstituted embryos, it is suggested that differential partitioning of mitochondria occurs during embryogenesis. Mitochondrial morphology changes substantially during oogenesis and throughout early cleavage stages. Somatic morphology and normal replication patterns are regained at the blastocyst stage. In pig oocytes and embryos, mitochondria aggregate and are closely associated with endoplasmic reticulum, lipid granules and large vesicles. Although the direct correlation of mitochondrial genes with reproductive traits is still unclear, some human degenerative diseases and performance traits in cattle can be related directly to specific mtDNA polymorphisms. In pigs, reciprocal-cross comparisons have indicated greater offspring parent similarity with dam than sire for lean:fat ratio. A difference was also observed for oxygen consumption and oxidative phosphorylation, but not

for anaerobic energy metabolism, in a pig reciprocal-cross experiment. Information on the transmission of mtDNA and its effects on performance will have many implications not only for our understanding of mitochondrial genetics but also for the increased productivity of animals. There are also potential ramifications to the animal cloning industry.

Publication Types:

- Review
- Review, Academic

PMID: 8145213 [PubMed - indexed for MEDLINE]

Display	Abstract	Sort	Save	Text	Clip Add	Order
---------	----------	------	------	------	----------	-------

[Write to the Help Desk](#)
[NCBI](#) | [NLM](#) | [NIH](#)
[Department of Health & Human Services](#)
[Freedom of Information Act](#) | [Disclaimer](#)

sparc-sun-solaris2.8 May 10 2002 11:21:51